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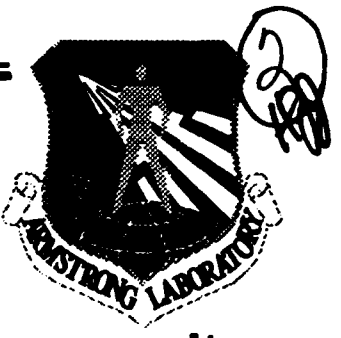

ARMSTRONG LABORATORY

WASTEWATER CHARACTERIZATION SURVEY, GENERAL MITCHELL INTERNATIONAL AIRPORT, AIR FORCE RESERVE FACILITY, MILWAUKEE, WISCONSIN

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July 1993

Final Technical Report for Period 20-31 July 1992

AIR FORCE MATERIEL COMMAND
BROOKS AIR FORCE BASE, TEXAS

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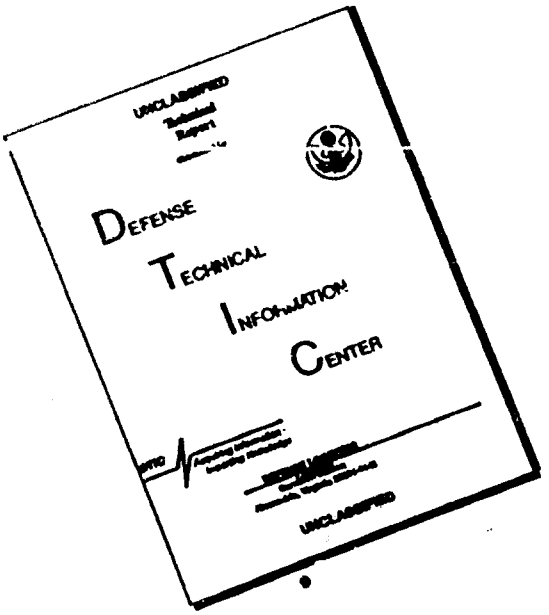

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Personnel from Armstrong Laboratory Water Quality Branch conducted a wastewater characterization survey at General Mitchell International Airport, Air Force Reserve Facility, Milwaukee, Wisconsin, from 20 to 31 Jul 92. The scope of the survey was to sample various sites around the base and characterize the wastewater. No significant findings were found except for three silver samples on 23 Jul 92 and one toluene sample on 22 Jul 92. The silver was only suspected at one site, and sample cross contamination is blamed for the other two sample results. Overall, the wastewater is typical of domestic wastewater and no significant changes should be conducted on current sampling and monitoring procedures. The Army Reserve Center's wastewater should be sampled and characterized if an appropriate sampling location can be found.

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ACKNOWLEDGMENTS

The author greatly appreciates the technical expertise and hard work provided by the other member of the survey team: SrA Joseph Green.

I would also like to thank all the personnel in the Bioenvironmental Engineering Services (BES) for their assistance in the accomplishment of this survey.

WASTEWATER CHARACTERIZATION SURVEY, GENERAL MITCHELL INTERNATIONAL AIRPORT, AIR FORCE RESERVE FACILITY, MILWAUKEE, WISCONSIN

INTRODUCTION

A wastewater characterization survey was conducted at General Mitchell International Airport (GMIAP), Air Force Reserve Facility, Milwaukee, Wisconsin, from 20-31 July 1992, by personnel from Armstrong Laboratory (AL) located at Brooks Air Force Base (AFB), Texas. Specific sampling sites around the base were sampled for various parameters. These sample results will be used by facility personnel to identify any toxic discharges in the wastewater collection system.

The survey was performed in response to a request from the 440th Tactical Airlift Wing (TAW), Acting Base Civil Engineer, (440 SG/CEEV). Armstrong Laboratory personnel who performed the survey included Capt Darrin L. Curtis (Project Engineer) and SrA Joseph Green.

DISCUSSION

Background

General Mitchell International Airport is a commercial airport owned and controlled by the city of Milwaukee. It is located 7 miles south of the center of Milwaukee and approximately 3 miles west of Lake Michigan. Both the Air Force Reserve Facility (AFRF) and Wisconsin Air National Guard (WANG) facility are located within the boundaries of General Mitchell International Airport. The landing area is 1500 acres, with an additional 385 acres purchased north, west, and south of the site for a controlled approach zone. The General Mitchell IAP is bounded on all sides by urban development, including Milwaukee to the north, South Milwaukee to the east, Oak Creek to the south, and Cudahy to the northeast. Residential development is generally less dense to the south and southwest.

In 1926, the Milwaukee County Park Commission purchased a 160-acre site known as Hamilton Field. The control, maintenance, and operation of the airport later were transferred to the Highway Committee of the Milwaukee County Board of Supervisors. The field was expanded to 1 mile^2 in 1942 to accommodate increased air traffic. It was officially named General Billy Mitchell Field by the U.S. Air Force (USAF) to avoid confusion with Mitchell AFB in New York and was recently renamed General Mitchell International Airport.

The 924th Reserve Training Wing (RTW) was activated at General Mitchell IAP in February 1952 and redesignated the 438th Fighter Bomber Wing in July 1952. The 438th Fighter Bomber Wing was redesignated the 247th Air Force Reserve Training Center (AFRTC), with F-80 and T-33 aircraft assigned. The AFRTC was authorized to

construct reserve training facilities at General Mitchell IAP in 1954 and began acquiring land in the southwest corner of the airport area. In November 1957, the 247 AFRTC was deactivated, and the 440th Troop Carrier Wing (TCW) was transferred to Milwaukee from Minneapolis. At that time, C-119 aircraft were assigned to the wing; and in 1971, the C-119s were replaced by C-130A aircraft.

The 440 TAW has developed from a group designated as the 440th Troop Carrier Group (TCG), which began in 1943 at Baer Field, Indiana. The TCG was deactivated in October 1945, and reactivated as the 440 TAW on 26 August 1947, in Minneapolis as a reserve organization; it was expanded in 1949. The present mission of the 440 TAW is combat-airlift support; paratroop and equipment drops; airlift of troops and equipment to forward areas; and aeromedical evacuation.

Sampling Strategy

During the presurvey conducted at General Mitchell IAP AFRF from 13-14 May 92, the sampling protocol that had been developed by Capt Curtis was reviewed by the Base Bioenvironmental Engineer (BEE) and Base Civil Engineer (BCE). All parties concurred with the sampling strategy, which included sampling various sites throughout the collection system.

Sampling Methods

Wastewater samples were typically collected over a 24-hour period as a time-proportional composite (i.e., a composite of 24 samples collected at 1-hour intervals). The automated composite sampler contains a 3-gallon glass jar which was packed in ice before each day of sampling. Samples collected for volatile organics, oils and greases, and total petroleum hydrocarbons were collected as grab samples. Any unusual characteristics (odor, color, etc.) of the samples were noted. Certain sites were sandbagged to dam the wastewater, a necessary step to gain the proper depth needed for the automatic samplers. If the composite sampler's collection strainer is not completely immersed in water, air will be drawn into the sampler collection jar instead of the wastewater sample.

Samples were placed in iced coolers and transported back to the workcenter, Bldg 219, for preservation; they were iced down until they were shipped to the Armstrong Laboratory Analytical Services Division at Brooks AFB TX. Sample preservation was in accordance with the *AFOEHL Sampling Procedures, March 1989 (8)*, commonly referred to as the "OEHL Sampling Guide."

Table 1 shows grab and composite parameters. If a sample was not collected in accordance with the parameters, the deviance from recommended sampling procedures was noted in the comments section under each site. The survey team, in collecting samples at low flow sites, sometimes had to add grabbed wastewater to the composite to bring the incomplete volume to the required volume.

Table 1: Parameters, Group, Type, Containers, and Preservation

PARAMETER NAME	TYPE	CONTAINER	PRESERVATION
GROUP A (other than O & G) Chemical Oxygen Demand Kjeldahl Nitrogen Organic Carbon Phosphorus, Total	**Composite**	Plastic	Cool to 4° C & H_2SO_4 to pH<2
GROUP A (O & G) Oil & Grease Total Petroleum Hydrocarbons	**Grab**	Glass	Cool to 4° C & H_2SO_4 to pH<2
GROUP E Phenols	**Composite**	Glass	Cool to 4° C & H_2SO_4 to pH<2
GROUP F Metals	**Composite**	Plastic	HNO_3 to pH<2
Group G Alkalinity Chloride Specific Conductance Surfactant-MBAS Solids	**Composite**	Plastic	Cool to 4° C
601/601	**Grab**	40 ml Vial	Cool to 4° C

RESULTS

Results of all the data collected during the survey, except for EPA Methods 601/602, are located in Appendix A. Appendix B lists the EPA Methods 601/602 data.

Quality Assurance/Quality Control (QA/QC)

Field Quality Assurance/Quality Control

A field QA/QC program was used during this survey to verify the accuracy and reproducibility of laboratory results. Errors in reporting analytical data can result from many causes, including equipment malfunctions and operator error, both during the sampling and analysis. Sample contamination is a common error and may result from residue in sampling containers or in preservation, handling, storage, and transport procedures. Appendix C contains the QA/QC data.

Reagent blanks are aliquots of distilled water that are as free of contaminants as possible and contain all the reagents in the same volume as is used in processing the samples. The reagent blank is used to correct for possible contamination resulting

from the preparation or processing of the sample. Reagent blank samples that contain no detectable pollutants indicate that proper procedures were used in the collection, preparation, and shipment of the sample.

Spike samples are aliquots of distilled water in which a known quantity of contaminant is added. Spikes verify the confidence of the data, through the recovery of known additions. Spike samples were prepared on-site using WasteWatR™ Quality Control Standards shown in Appendix D.

Internal QA/QC

The Analytical Services Division's Quality Assurance Plan establishes the guidelines and rules necessary to meet the analytical laboratory requirements of 43 states, the U.S. Environmental Protection Agency, and private accrediting agencies. Specific activities include inserting a minimum of one blind sample control for each parameter analyzed on a monthly basis and periodic auditing of the laboratory quality assurance items from each branch. All instruments are calibrated each day of use; at least 1 National Institute Standards and Technology/Standard Reference Materials (NIST/SRM) traceable standard and control sample is included with each analytical run. Corrective action is documented every time a quality assurance parameter is not met and all sample data have established detection limits. The laboratory participates in numerous proficiency surveys and interlaboratory quality evaluation programs; all quality control samples are plotted and tracked by the individual work sections.

Sampling Sites

Manhole #2 (MH #2)

MH #2 is located on 1st Avenue near building 108 (Appendix E). Samples were collected on 22-24 Jul 92.

Manhole #5 (MH #5)

MH #5 is located in the parking area near building 113 on B Street directly across from 2nd Avenue (Appendix E). Samples were collected on 22-24 Jul 92.

Comments: 22 Jul 92, sandbagged
23 Jul 92, sandbagged, all samples composite
24 Jul 92, sandbagged, all samples grab

Manhole #9 (MH #9)

MH #9 is located on the southwest corner of 7th Avenue and B street (Appendix E). Samples were collected on 22-24 Jul 92.

Comments: 22 Jul 92, sandbagged
23 Jul 92, sandbagged
24 Jul 92, sandbagged

Manhole #12 (MH #12)

MH #12 is located in the parking area on B Street between buildings 208 and 205 (Appendix E). Samples were collected on 22-23 Jul 92.

Comments: 22 Jul 92, sandbagged
23 Jul 92, sandbagged

Manhole #21 (MH #21)

MH #21 is located between B Street and building 218 (Appendix E). Samples were collected on 22-24 Jul 92.

Comments: 22 Jul 92, sandbagged, all samples grab
23 Jul 92, sandbagged
24 Jul 92, sandbagged

Manhole #23 (MH #23)

MH #23 is located on ' st Avenue across from building 219 (Appendix E). Samples were collected on 22-24 Jul 92.

Comments: 22 Jul 92, sandbagged, soapy appearance
23 Jul 92, sandbagged
24 Jul 92, sandbagged, soapy appearance

Discussion of Results

Selected data will be briefly discussed by site in this section. Values that were above typical levels will be cited. Table 2 has concentration values for various parameters of typical domestic wastewater. It should be noted that GMIAP AFRF's wastewater is influenced by some industrial wastes.

Table 2: Typical Composition of Untreated Domestic Wastewater (After Metcalf & Eddy, 1979 (5))
(All values except settleable solids are expressed in mg/L)[a]

Constituent	Concentration		
	Strong	Medium	Weak
Solids, Total:	1200	720	350
Solids, Total Dissolved	850	500	250
Solids, Fixed	525	300	145
Solids, Volatile	325	200	105
Solids, Total Suspended	350	220	100
Solids, Fixed Suspended	75	55	20
Solids, Volatile Suspended	275	165	80
Solids, Settleable (ml/L)	20	10	5
Biochemical oxygen demand, 5-day,20°C	400	220	110
Total organic carbon (TOC)	290	160	80
Chemical oxygen demand (COD)	1000	500	250
Nitrogen (total as N):	85	40	20
Organic (Kjeldahl)	35	15	8
Free ammonia	50	25	12
Nitrites	0	0	0
Nitrates	0	0	0
Phosphorus (total as P):	15	8	4
Phosphorus, Organic	5	3	1
Phosphorus, Inorganic	10	5	3
Chlorides[b]	100	50	30
Alkalinity (as $CaCO_3$)[b]	200	100	50
Grease	150	100	50

[a] mg/L=g/m^3.
[b] Values should be increased by amount in domestic water supply.
Note: 1.8(°C) + 32 = °F

MH #2

The chemical oxygen demand (COD) and Kjeldahl nitrogen concentrations in the MH #2 wastewater are typical of weak to medium domestic wastewater. Oil & grease are typical of weak to strong domestic wastewater and the organic carbon and total phosphorus are typical of a weak domestic wastewater. No volatile organics or EPA 601/602 volatile organics were found at this location. MH #2 is the last sampling location before the waste exits the base and would best demonstrate the concentration and composition of discharged effluents.

MH #5

The concentration of Kjeldahl nitrogen in MH #5 is typical of a medium domestic wastewater. Oil & grease, COD, organic carbon and total phosphorus are typical of a weak domestic wastewater. Silver was above typical levels at this site on 23 Jul 92. The silver could have come from the nondestructive inspection (NDI) building or it could indicate possible cross contamination of the sample in the field. No significant amounts of volatile organics (EPA Methods 601/602) were found at this location.

MH #9

Organic carbon, Kjeldahl nitrogen, and COD concentrations in MH #9 wastewater are typical of a medium to strong domestic wastewater. Oil & grease levels were typical of a weak to medium domestic wastewater, and the total phosphorus content was typical of a strong domestic wastewater. Silver levels were above typical domestic wastewater levels. As in MH #5, the silver levels reported could be due to cross contamination. No significant amounts of volatile organics (EPA Methods 601/602) were found except for a small amount of toluene on 24 Jul 92.

MH #12

Kjeldahl nitrogen concentrations in MH #12 were typical of a weak to medium domestic wastewater. Oil & grease, COD, organic carbon, and total phosphorus were typical of a weak domestic wastewater. There were no significant amounts of volatile organics (EPA Methods 601/602) found at this site.

MH #21

Kjeldahl nitrogen levels in MH #21 were typical of a medium domestic wastewater and the COD levels were typical of a weak to medium domestic wastewater. The concentrations of oil & grease, organic carbon, and total phosphorus were typical of a weak to strong domestic wastewater. There were high levels of silver reported on 23 Jul 92. The NDI shop and aircraft maintenance are the only shops that discharge to this location. The silver could have come from X-ray film processing in NDI. The silver at this site may have contaminated the samples at MH #5 and MH #9 on this sampling day. Toluene, found on 22 Jul 92, may be linked to the silver readings on the following day due to work schedules.

MH #23

Kjeldahl nitrogen and COD concentrations in MH #23 were typical of medium to strong domestic wastewater. Oil & grease and total phosphorus were typical of weak to medium domestic wastewater. The organic carbon was typical of a strong domestic wastewater. Phenols were found at this site. Toluene, benzene, and xylene were found at this site. This site had very little flow; therefore, the wastewater was very concentrated. Air ground equipment (AGE) is the only shop upstream, and may be the source of the volatile organic chemicals found in the wastewater.

RECOMMENDATIONS AND CONCLUSIONS

Wastewater Characterization

The wastewater leaving the base is a typical domestic wastewater. The very low flow on base should be considered when wastewater concentrations are evaluated. No sampling parameter was above typical levels except for the silver found at three locations. If a permit should be required in the future, the Army Reserve Center (ARC) should be monitored to evaluate the type of wastewater it is producing. During the survey, samples were not taken at the ARC because a proper sampling location could not be found. A review of the sanitary sewerage system for the ARC may be needed to locate a representative sampling location.

Silver

It is my view that the silver we found in the wastewater during this survey is discharged by NDI and that samples taken from MH #5 and MH #9 were contaminated in the field. It may be necessary to resample MH #21 to verify the silver levels found during the survey.

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Appendix A

All Data Except 601/602

TABLE A-1, Results other than 601/602
Manhole Number Two (MH #2)
General Mitchell Field Wastewater Characterization Survey
20-31 July 1992

Site			MH #2	MH #2	MH #2
Sample Number			CN921813	CN921825	CN921837
Date			22-Jul-92	23-Jul-92	24-Jul-92
Analyte	Units	Method			
pH			6.4	6.4	6
Temperature	°C		18	18	19
Chemical Oxygen Demand	mg/L	STD METH 508C	465	268	108
Kjeldahl Nitrogen	mg/L	EPA 351.2	22	23	27.5
Oil & Grease	mg/L	EPA 413	182.4	49.6	40
Organic Carbon	mg/L	EPA 415.1	71	74	40
Phosphorus, Total	mg/L	EPA 365.1	1.2	3	3.1
Total Petroleum Hydroc.	mg/L	EPA 418.1	43.2	25.6	9.6
Phenols	µg/L	EPA 420.2	40	16	15
Arsenic	µg/L	EPA 206.2	<10	12	11
Barium	µg/L	EPA 200.7	<100	<100	<100
Beryllium	µg/L	EPA 210.1	<10	<10	<10
Cadmium	µg/L	EPA 213.2	13	7.9	4.7
Calcium	mg/L	EPA 200.7	58	60	40
Chromium, Total	µg/L	EPA 218.1	<50	<50	<50
Copper	µg/L	EPA 220.1	120	<50	<50
Iron	µg/L	EPA 236.1	760	1200	1700
Lead	µg/L	EPA 239.2	<20	<20	<20
Magnesium	mg/L	EPA 200.7	37	40	20
Manganese	µg/L	EPA 243.1	78	74	82
Mercury	µg/L	EPA 245.1	<1.0	<1.0	<1.0
Nickel	µg/L	EPA 249.1	<50	<50	<50
Silver	µg/L	EPA 200.7	<5	5	<5
Zinc	µg/L	EPA 289.1	140	130	120
Specific Conductance	µmhos	EPA 120.1	883	922	971
Surfactants-MBAS	mg/L	EPA 425.1	0.1	0.2	0.2

TABLE A-2, Results of Analytes other than 601/602 Manhole Number Five (MH #5) General Mitchell Field Wastewater Characterization Survey 20-31 July 1992					
Site			MH #5	MH #5	MH #5
Sample Number			CN921809	CN921821	CN921833
Date			22-Jul-92	23-Jul-92	24-Jul-92
Analyte	Units	Method			
pH			6.3	6	6.1
Temperature	°C		19	*	19
Chemical Oxygen Demand	mg/L	STD METH 508C	320	180	207
Kjeldahl Nitrogen	mg/L	EPA 351.2	50	28	37
Oil & Grease	mg/L	EPA 413	38.4	17.4	13.9
Organic Carbon	mg/L	EPA 415.1	86	58	47
Phosphorus, Total	mg/L	EPA 365.1	6	2.7	5.3
Total Petroleum Hydroc.	mg/L	EPA 418.1	4.8	2.6	6.7
Phenols	µg/L	EPA 420.2	46	25	175
Arsenic	µg/L	EPA 206.2	<10	12	<10
Barium	µg/L	EPA 200.7	<100	<100	<100
Beryllium	µg/L	EPA 210.1	<10	<10	<10
Cadmium	µg/L	EPA 213.2	13	1.9	14
Calcium	mg/L	EPA 200.7	53	60	40
Chromium, Total	µg/L	EPA 218.1	<50	<50	<50
Copper	µg/L	EPA 220.1	140	<50	<50
Iron	µg/L	EPA 236.1	470	200	550
Lead	µg/L	EPA 239.2	<20	65	<20
Magnesium	mg/L	EPA 200.7	30	40	13
Manganese	µg/L	EPA 243.1	62	63	87
Mercury	µg/L	EPA 245.1	<1.0	<1.0	<1.0
Nickel	µg/L	EPA 249.1	<50	<50	<50
Silver	µg/L	EPA 200.7	<5	1740	10
Zinc	µg/L	EPA 289.1	180	58	230
Specific Conductance	µmhos	EPA 120.1	1062	925	746
Surfactants-MBAS	mg/L	EPA 425.1	0.4	0.3	<0.1

* Temperature was not measured on 23 Jul 93.

TABLE A-3, Results of Analytes other than 601/602 Manhole Number Nine (MH #9) General Mitchell Field Wastewater Characterization Survey 20-31 July 1992					
Site			MH #9	MH #9	MH #9
Sample Number			CN921803	CN921815	CN921829
Date			22-Jul-92	23-Jul-92	24-Jul-92
Analyte	Units	Method			
pH			6.4	6	6
Temperature	°C		18	18	20
Chemical Oxygen Demand	mg/L	STD METH 508C	575	424	970
Kjeldahl Nitrogen	mg/L	EPA 351.2	53	73	120
Oil & Grease	mg/L	EPA 413	12.8	144	92.8
Organic Carbon	mg/L	EPA 415.1	200	226	315
Phosphorus, Total	mg/L	EPA 365.1	4.8	25.6	28.5
Total Petroleum Hydroc.	mg/L	EPA 418.1	6	28.8	9.6
Phenols	µg/L	EPA 420.2	20	35	85
Arsenic	µg/L	EPA 206.2	14	17	26
Barium	µg/L	EPA 200.7	<100	<100	110
Beryllium	µg/L	EPA 210.1	<10	<10	<10
Cadmium	µg/L	EPA 213.2	2.9	2.7	<1.0
Calcium	mg/L	EPA 200.7	70	90	110
Chromium, Total	µg/L	EPA 218.1	<50	<50	<50
Copper	µg/L	EPA 220.1	120	76	<50
Iron	µg/L	EPA 236.1	640	1100	2000
Lead	µg/L	EPA 239.2	28	<20	29
Magnesium	mg/L	EPA 200.7	50	50	60
Manganese	µg/L	EPA 243.1	360	7	930
Mercury	µg/L	EPA 245.1	<1.0	<1.0	<1.0
Nickel	µg/L	EPA 249.1	<50	<50	<50
Silver	µg/L	EPA 200.7	<5	870	<5
Zinc	µg/L	EPA 289.1	210	570	1300
Specific Conductance	µmhos	EPA 120.1	1318	1558	1700
Surfactants-MBAS	mg/L	EPA 425.1	0.4	0.3	0.6

TABLE A-4, Results of Analytes other than 601/602 Manhole Number Twelve (MH #12) General Mitchell Field Wastewater Characterization Survey 20-31 July 1992					
Site			MH #12	MH #12	MH #12
Sample Number			CN921805	CN921817	CN921827
Date			22-Jul-92	23-Jul-92	24-Jul-92
Analyte	Units	Method			
pH			6.1	6	6
Temperature	°C		18	17	17
Chemical Oxygen Demand	mg/L	STD METH 508C	85	40	93
Kjeldahl Nitrogen	mg/L	EPA 351.2	27	9.3	35
Oil & Grease	mg/L	EPA 413	9.6	46.4	11.5
Organic Carbon	mg/L	EPA 415.1	25	15	40
Phosphorus, Total	mg/L	EPA 365.1	1.4	0.8	3.3
Total Petroleum Hydroc.	mg/L	EPA 418.1	1.8	4.8	2.6
Phenols	µg/L	EPA 420.2	30	33	<10
Arsenic	µg/L	EPA 206.2	12	15	11
Barium	µg/L	EPA 200.7	<100	<100	<100
Beryllium	µg/L	EPA 210.1	<10	<10	<10
Cadmium	µg/L	EPA 213.2	32	16	54
Calcium	mg/L	EPA 200.7	73	80	60
Chromium, Total	µg/L	EPA 218.1	<50	<50	<50
Copper	µg/L	EPA 220.1	53	<50	<50
Iron	µg/L	EPA 236.1	260	150	820
Lead	µg/L	EPA 239.2	<20	<20	22
Magnesium	mg/L	EPA 200.7	43	50	30
Manganese	µg/L	EPA 243.1	<50	<50	<50
Mercury	µg/L	EPA 245.1	<1.0	<1.0	<1.0
Nickel	µg/L	EPA 249.1	<50	<50	<50
Silver	µg/L	EPA 200.7	<5	<5	6
Zinc	µg/L	EPA 289.1	82	64	210
Specific Conductance	µmhos	EPA 120.1	1037	1000	922
Surfactants-MBAS	mg/L	EPA 425.1	0.2	<0.1	0.3

TABLE A-5, Results of Analytes other than 601/602 Manhole Number Twenty-One (MH #21) General Mitchell Field Wastewater Characterization Survey 20-31 July 1992					
Site			MH #21	MH #21	MH #21
Sample Number			CN921807	CN921819	CN921831
Date			22-Jul-92	23-Jul-92	24-Jul-92
Analyte	Units	Method			
pH			6.3	6.1	6.3
Temperature	°C		21	18	20
Chemical Oxygen Demand	mg/L	STD METH 508C	455	210	95
Kjeldahl Nitrogen	mg/L	EPA 351.2	75	40	36.5
Oil & Grease	mg/L	EPA 413	15.8	185.6	144
Organic Carbon	mg/L	EPA 415.1	278	45	48
Phosphorus, Total	mg/L	EPA 365.1	24.5	5.3	5
Total Petroleum Hydroc.	mg/L	EPA 418.1	3.8	19.2	25.6
Phenols	µg/L	EPA 420.2	40	16	15
Arsenic	µg/L	EPA 206.2	16	<10	<10
Barium	µg/L	EPA 200.7	<100	<100	<100
Beryllium	µg/L	EPA 210.1	<10	<10	<10
Cadmium	µg/L	EPA 213.2	8.5	34	*
Calcium	mg/L	EPA 200.7	65	40	18
Chromium, Total	µg/L	EPA 218.1	<50	<50	<50
Copper	µg/L	EPA 220.1	200	88	<50
Iron	µg/L	EPA 236.1	1900	770	670
Lead	µg/L	EPA 239.2	20	<20	<20
Magnesium	mg/L	EPA 200.7	20	14	<1.0
Manganese	µg/L	EPA 243.1	180	59	56
Mercury	µg/L	EPA 245.1	<1.0	<1.0	<1.0
Nickel	µg/L	EPA 249.1	<50	<50	<50
Silver	µg/L	EPA 200.7	<5	8430	<5
Zinc	µg/L	EPA 289.1	840	200	160
Specific Conductance	µmhos	EPA 120.1	858	670	644
Surfactants-MBAS	mg/L	EPA 425.1	<0.1	0.3	<0.1

* No sample collected for cadmium on 24 Jul 92.

TABLE A-6, Results of Analytes other than 601/602 Manhole Number Twenty-Three (MH #23) General Mitchell Field Wastewater Characterization Survey 20-31 July 1992					
Site			MH #23	MH #23	MH #23
Sample Number			CN921811	CN921823	CN921835
Date			22-Jul-92	23-Jul-92	24-Jul-92
Analyte	Units	Method			
pH			<6.0	6	6
Temperature	°C		17	15	18
Chemical Oxygen Demand	mg/L	STD METH 508C	450	836	714
Kjeldahl Nitrogen	mg/L	EPA 351.2	54	63	64
Oil & Grease	mg/L	EPA 413	55.2	20	97.2
Organic Carbon	mg/L	EPA 415.1	232	300	250
Phosphorus, Total	mg/L	EPA 365.1	5.8	8.2	5.7
Total Petroleum Hydroc.	mg/L	EPA 418.1	10.8	5.1	33.6
Phenols	µg/L	EPA 420.2	250	375	325
Arsenic	µg/L	EPA 206.2	<10	<10	<10
Barium	µg/L	EPA 200.7	<100	<100	<100
Beryllium	µg/L	EPA 210.1	<10	<10	<10
Cadmium	µg/L	EPA 213.2	9.8	23	15
Calcium	mg/L	EPA 200.7	44	44	40
Chromium, Total	µg/L	EPA 218.1	<50	53	<50
Copper	µg/L	EPA 220.1	<50	<50	<50
Iron	µg/L	EPA 236.1	1400	2000	2000
Lead	µg/L	EPA 239.2	23	<20	46
Magnesium	mg/L	EPA 200.7	20	30	20
Manganese	µg/L	EPA 243.1	77	88	87
Mercury	µg/L	EPA 245.1	<1.0	2.1	<1.0
Nickel	µg/L	EPA 249.1	<50	<50	<50
Silver	µg/L	EPA 200.7	10	10	<5
Zinc	µg/L	EPA 289.1	210	300	250
Specific Conductance	µmhos	EPA 120.1	811	925	923
Surfactants-MBAS	mg/L	EPA 425.1	<0.1	0.2	0.1

TABLE A-7, Results of Analytes other than 601/602
Data for 22-Jul-92
General Mitchell Field Wastewater Characterization Survey
20-31 July 1992

Site			MH #2	MH #5	MH #9	MH #12	MH #21	MH #23
Sample Number			CN921813	CN921809	CN921803	CN921805	CN921807	CN921811
Date			22-Jul-92	22-Jul-92	22-Jul-92	22-Jul-92	22-Jul-92	22-Jul-92
Analyte	Units	Method						
pH			6.4	6.3	6.4	6.1	6.3	<6.0
Temperature	°C		18	19	18	18	21	17
Chemical Oxygen Demand	mg/L	STD METH 508C	465	320	575	85	455	450
Kjeldahl Nitrogen	mg/L	EPA 351.2	22	50	53	27	75	54
Oil & Grease	mg/L	EPA 413	182.4	38.4	12.8	9.6	15.8	55.2
Organic Carbon	mg/L	EPA 415.1	71	86	200	25	278	232
Phosphorus, Total	mg/L	EPA 365.1	1.2	6	4.8	1.4	24.5	5.8
Total Petroleum Hydroc.	mg/L	EPA 418.1	43.2	4.8	6	1.8	3.8	10.8
Phenols	µg/L	EPA 420.2	40	46	20	30	40	250
Arsenic	µg/L	EPA 206.2	<10	<10	14	12	16	<10
Barium	µg/L	EPA 200.7	<100	<100	<100	<100	<100	<100
Beryllium	µg/L	EPA 210.1	<10	<10	<10	<10	<10	<10
Cadmium	µg/L	EPA 213.2	13	13	2.9	32	8.5	9.8
Calcium	mg/L	EPA 200.7	58	53	70	73	65	44
Chromium, Total	µg/L	EPA 218.1	<50	<50	<50	<50	<50	<50
Copper	µg/L	EPA 220.1	120	140	120	53	200	<50
Iron	µg/L	EPA 236.1	760	470	640	260	1900	1400
Lead	µg/L	EPA 239.2	<20	<20	28	<20	20	23
Magnesium	mg/L	EPA 200.7	37	30	50	43	20	20
Manganese	µg/L	EPA 243.1	78	62	360	<50	180	77
Mercury	µg/L	EPA 245.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	µg/L	EPA 249.1	<50	<50	<50	<50	<50	<50
Silver	µg/L	EPA 200.7	<5	<5	<5	<5	<5	10
Zinc	µg/L	EPA 289.1	140	180	210	82	840	210
Specific Conductance	µmhos	EPA 120.1	883	1062	1318	1037	858	811
Surfactants-MBAS	mg/L	EPA 425.1	0.1	0.4	0.4	0.2	<0.1	<0.1

TABLE A-8, Results of Analytes other than 601/602
Data for 23-Jul-92
General Mitchell Field Wastewater Characterization Survey
20-31 July 1992

Site			MH #2	MH #5	MH #9	MH #12	MH #21	MH #23
Sample Number			CN921825	CN921821	CN921815	CN921817	CN921819	CN921823
Date			23-Jul-92	23-Jul-92	23-Jul-92	23-Jul-92	23-Jul-92	23-Jul-92
Analyte	Units	Method						
pH			6.4	6	6	6	6.1	6
Temperature	°C		18	-	18	17	18	15
Chemical Oxygen Demand	mg/L	STD METH 508C	268	180	424	40	210	836
Kjeldahl Nitrogen	mg/L	EPA 351.2	23	28	73	9.3	40	63
Oil & Grease	mg/L	EPA 413	49.6	17.4	144	46.4	185.6	20
Organic Carbon	mg/L	EPA 415.1	74	58	226	15	45	300
Phosphorus, Total	mg/L	EPA 365.1	3	2.7	25.6	0.8	5.3	8.2
Total Petroleum Hydroc.	mg/L	EPA 418.1	25.6	2.6	28.8	4.8	19.2	5.1
Phenols	µg/L	EPA 420.2	16	25	35	33	16	375
Arsenic	µg/L	EPA 206.2	12	12	17	15	<10	<10
Barium	µg/L	EPA 200.7	<100	<100	<100	<100	<100	<100
Beryllium	µg/L	EPA 210.1	<10	<10	<10	<10	<10	<10
Cadmium	µg/L	EPA 213.2	7.9	1.9	2.7	16	34	23
Calcium	mg/L	EPA 200.7	60	60	90	80	40	44
Chromium, Total	µg/L	EPA 218.1	<50	<50	<50	<50	<50	53
Copper	µg/L	EPA 220.1	<50	<50	76	<50	88	<50
Iron	µg/L	EPA 236.1	1200	200	1100	150	770	2000
Lead	µg/L	EPA 239.2	<20	65	<20	<20	<20	<20
Magnesium	mg/L	EPA 200.7	40	40	50	50	14	30
Manganese	µg/L	EPA 243.1	74	63	7	<50	59	88
Mercury	µg/L	EPA 245.1	<1.0	<1.0	<1.0	<1.0	<1.0	2.1
Nickel	µg/L	EPA 249.1	<50	<50	<50	<50	<50	<50
Silver	µg/L	EPA 200.7	5	1740	870	<5	8430	10
Zinc	µg/L	EPA 289.1	130	58	570	64	200	300
Specific Conductance	µmhos	EPA 120.1	922	925	1558	1000	670	925
Surfactants-MBAS	mg/L	EPA 425.1	0.2	0.3	0.3	<0.1	0.3	0.2

TABLE A-9, Results of Analytes other than 601/602
Data for 24-Jul-92
General Mitchell Field Wastewater Characterization Survey
20-21 July 1992

Site			MH #2	MH #5	MH #9	MH #12	MH #21	MH #23
Sample Number			CN921837	CN921833	CN921829	CN921827	CN921831	CN921835
Date			24-Jul-92	24-Jul-92	24-Jul-92	24-Jul-92	24-Jul-92	24-Jul-92
Analyte	Units	Method						
pH			6	6.1	6	6	6.3	6
Temperature	°C		19	19	20	17	20	18
Chemical Oxygen Demand	mg/L	STD METH 508C	108	207	970	93	95	714
Kjeldahl Nitrogen	mg/L	EPA 351.2	27.5	37	120	35	36.5	64
Oil & Grease	mg/L	EPA 413	40	13.9	92.8	11.5	144	97.2
Organic Carbon	mg/L	EPA 415.1	40	47	315	40	48	250
Phosphorus, Total	mg/L	EPA 365.1	3.1	5.3	28.5	3.3	5	5.7
Total Petroleum Hydroc.	mg/L	EPA 418.1	9.6	6.7	9.6	2.6	25.6	33.6
Phenols	µg/L	EPA 420.2	15	175	85	<10	15	325
Arsenic	µg/L	EPA 206.2	11	<10	26	11	<10	<10
Barium	µg/L	EPA 200.7	<100	<100	110	<100	<100	<100
Beryllium	µg/L	EPA 210.1	<10	<10	<10	<10	<10	<10
Cadmium	µg/L	EPA 213.2	4.7	14	<1.0	54		15
Calcium	mg/L	EPA 200.7	40	40	110	60	18	40
Chromium, Total	µg/L	EPA 218.1	<50	<50	<50	<50	<50	<50
Copper	µg/L	EPA 220.1	<50	<50	<50	<50	<50	<50
Iron	µg/L	EPA 236.1	1700	550	2000	820	670	2000
Lead	µg/L	EPA 239.2	<20	<20	29	22	<20	46
Magnesium	mg/L	EPA 200.7	20	13	60	30	<1.0	20
Manganese	µg/L	EPA 243.1	82	87	930	<50	56	87
Mercury	µg/L	EPA 245.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	µg/L	EPA 249.1	<50	<50	<50	<50	<50	<50
Silver	µg/L	EPA 200.7	<5	10	<5	6	<5	<5
Zinc	µg/L	EPA 289.1	120	230	1300	210	160	250
Specific Conductance	µmhos	EPA 120.1	971	746	1700	922	644	923
Surfactants-MBAS	mg/L	EPA 425.1	0.2	<0.1	0.6	0.3	<0.1	0.1

Appendix B

601/602 Data

TABLE B-1, Results of 601/602
Data for 22-Jul-92
General Mitchell Field Wastewater Characterization Survey
20-31 July 1992

Site			MH #2	MH #5	MH #9	MH #12	MH #21	MH #23
Sample Number			GN921812	GN921808	GN921802	GN921804	GN921806	GN921810
Date			22-Jul-92	22-Jul-92	22-Jul-92	22-Jul-92	22-Jul-92	22-Jul-92
Analyte	Units	Method						
Bromodichloromethane	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Bromoform	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Carbon tetrachloride	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Chlorobenzene	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Chloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	µg/L	EPA 601	<0.5	0.9	0.9	<0.5	<0.5	1.7
Chloromethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Chlorodibromomethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
1,2-Dichlorobenzene	µg/L	EPA 601	<4	<4	<4	<4	<4	<4
1,3-Dichlorobenzene	µg/L	EPA 601	<2	<2	<2	<2	<2	<2
1,4-Dichlorobenzene	µg/L	EPA 601	<4	5	10	<4	8	<4
Dichlorodifluoromethane	µg/L	EPA 601	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,2-Dichloroethane	µg/L	EPA 601	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1-Dichloroethene	µg/L	EPA 601	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,2-Dichloropropane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Methylene chloride	µg/L	EPA 601	<2	<2	<2	<2	<2	12
1,1,2,2-Tetrachloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	3.9	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Trichloroethylene	µg/L	EPA 601	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Trichlorofluoromethane	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Vinyl chloride	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
2-Chloroethylvinyl ether	µg/L	EPA 601	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Freon 113	µg/L	EPA 601	<0.6	5.1	<0.6	<0.6	0.6	5.5
1,3-Dichlorobenzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,4-Dichlorobenzene	µg/L	EPA 602	<0.5	5.4	10	<0.5	8.6	<0.5
Ethyl benzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chlorobenzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Toluene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	870	61
Benzene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	18
1,2-Dichlorobenzene	µg/L	EPA 602	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	32
m-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	
p-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	76

NOTE: Shaded blocks indicate detectable concentrations of volatile organics.

TABLE B-2, Results of 601/602
Data for 22-Jul-92
General Mitchell Field Wastewater Characterization Survey
20-31 July 1992

Site			MH #2	MH #5	MH #9	MH #12	MH #21	MH #23
Sample Number			GN921824	GN921820	GN921814	GN921816	GN921818	GN921822
Date			23-Jul-92	23-Jul-92	23-Jul-92	23-Jul-92	23-Jul-92	23-Jul-92
Analyte	Units	Method						
Bromodichloromethane	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Bromoform	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Carbon tetrachloride	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Chlorobenzene	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Chloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	µg/L	EPA 601	<0.5	<0.5	<0.5	1.6	<0.5	0.6
Chloromethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Chlorodibromomethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
1,2-Dichlorobenzene	µg/L	EPA 601	<4	<4	<4	<4	<4	<4
1,3-Dichlorobenzene	µg/L	EPA 601	<2	<2	<2	<2	<2	<2
1,4-Dichlorobenzene	µg/L	EPA 601	<4	<4	18	<4	<4	<4
Dichlorodifluoromethane	µg/L	EPA 601	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,2-Dichloroethane	µg/L	EPA 601	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1-Dichloroethene	µg/L	EPA 601	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	µg/L	EPA 601	<0.4	<0.4		<0.4	<0.4	<0.4
1,2-Dichloropropane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Methylene chloride	µg/L	EPA 601	<2	<2	<2	<2	<2	47
1,1,2,2-Tetrachloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Trichloroethylene	µg/L	EPA 601	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Trichlorofluoromethane	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Vinyl chloride	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
2-Chloroethylvinyl ether	µg/L	EPA 601	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Freon 113	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
1,3-Dichlorobenzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<20
1,4-Dichlorobenzene	µg/L	EPA 602	<0.5	<0.5	18	<0.5	<0.5	<30
Ethyl benzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<20
Chlorobenzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<20
Toluene	µg/L	EPA 602	<0.3	0.9	3.1	0.9	<0.3	320
Benzene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	90
1,2-Dichlorobenzene	µg/L	EPA 602	<0.5	<0.5	<0.5	<0.5	<0.5	<30
o-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	190
m-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	
p-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	350

NOTE: Shaded blocks indicate detectable concentrations of volatile organics.

TABLE B-3, Results of 601/602
Data for 24-Jul-92
General Mitchell Field Wastewater Characterization Survey
20-31 July 1992

Site			MH #2	MH #5	MH #9	MH #12	MH #21	MH #23
Sample Number			GN921836	GN921832	GN921828	GN921826	GN921830	GN921834
Date			24-Jul-92	24-Jul-92	24-Jul-92	24-Jul-92	24-Jul-92	24-Jul-92
Analyte	Units	Method						
Bromodichloromethane	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Bromoform	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Carbon tetrachloride	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Chlorobenzene	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Chloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	µg/L	EPA 601	<0.5	2.0	1.8	1.8	1.0	1.0
Chloromethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Chlorodibromomethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
1,2-Dichlorobenzene	µg/L	EPA 601	<4	<4	<4	<4	<4	<4
1,3-Dichlorobenzene	µg/L	EPA 601	<2	<2	<2	<2	<2	<2
1,4-Dichlorobenzene	µg/L	EPA 601	<4	14	9	6	6	<4
Dichlorodifluoromethane	µg/L	EPA 601	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,2-Dichloroethane	µg/L	EPA 601	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,1-Dichloroethene	µg/L	EPA 601	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
1,2-Dichloropropane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Methylene chloride	µg/L	EPA 601	<2	<2	<2	<2	<2	15
1,1,2,2-Tetrachloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	EPA 601	<0.5	<0.5	<0.5	2.9	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Trichloroethylene	µg/L	EPA 601	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Trichlorofluoromethane	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Vinyl chloride	µg/L	EPA 601	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	µg/L	EPA 601	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
2-Chloroethylvinyl ether	µg/L	EPA 601	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	µg/L	EPA 601	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Freon 113	µg/L	EPA 601	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
1,3-Dichlorobenzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
1,4-Dichlorobenzene	µg/L	EPA 602	<0.5	14	8.8	5.5	6.5	<0.5
Ethyl benzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chlorobenzene	µg/L	EPA 602	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Toluene	µg/L	EPA 602	<0.3	<0.3	33	<0.3	<0.3	130
Benzene	µg/L	EPA 602	<0.4	<0.4	<0.4	<0.4	<0.4	25
1,2-Dichlorobenzene	µg/L	EPA 602	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4	5.2	<0.4	<0.4
m-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4		<0.4	
p-Xylene	µg/L	EPA 602	<0.4	<0.4	<0.4	11	<0.4	130

NOTE: Shaded blocks indicate detectable concentrations of volatile organics.

Appendix C

Quality Assurance/Quality Control Data

TABLE C-1, QA/QC Results
Samples for 27-Jul-92
General Mitchell Field Wastewater Characterization Survey
20-31 July 1992

Analyte	Units	Method	Blank GN921839 27-Jul-92	Blank GN921843 27-Jul-92	Spike GN921841 27-Jul-92	Spike GN921842 27-Jul-92	Certified Value[1]	Advisory Range[2]		Result
Arsenic	µg/L	EPA 206.2	<10	<10	103	105	106	80	125	OK
Barium	µg/L	EPA 200.7	<100	<100	<100	<100	469	384	553	Low
Beryllium	µg/L	EPA 210.1	<10	<10	72	72	81.3	67	96	OK
Cadmium	µg/L	EPA 213.2	<1.0	<1.0	46	101	148	121	174	Low
Calcium	mg/L	EPA 200.7	60	<10	<1.0	<1.0	*	*	*	*
Chromium, Total	µg/L	EPA 218.1	<50	<50	740	750	831	681	980	OK
Copper	µg/L	EPA 220.1	<50	<50	<50	<50	221	181	261	Low
Iron	µg/L	EPA 236.1	<100	<100	170	170	168	125	198	OK
Lead	µg/L	EPA 239.2	<20	<20	64	65	76.7	63	90	OK
Magnesium	mg/L	EPA 200.7	40	<1.0	<1.0	<1.0	*	*	*	*
Manganese	µg/L	EPA 243.1	<50	<50	190	190	188	154	222	OK
Mercury	µg/L	EPA 245.1	<1	<1	7.31	8.33	8.12	6.1	10	OK
Nickel	µg/L	EPA 249.1	<50	<50	330	320	346	284	409	OK
Silver	µg/L	EPA 200.7	10	<5	80	80	89.5	73	106	OK
Zinc	µg/L	EPA 289.1	<50	<50	84	95	99.5	82	117	OK

* Note: No spike was run for this specific analyte.
[1] Certified values are equal to 100% of each parameter in the indicated standard.
[2] Advisory ranges are listed as guidelines for acceptable recoveries given the limitations of the EPA methodologies commonly used to determine these parameters. The range closely approximates the 95% confidence interval for these parameters based upon the experimental data generated by ERA and data from the USEPA WP, WS and CLP interlaboratory performance evaluation programs.

TABLE C-2, QA/QC Results for 601/602 Samples for 27-Jul-92 General Mitchell Field Wastewater Characterization Survey 20-31 July 1992				
			Blank	Blank
			GN921838	GN921840
Analyte	Units	Method	27-Jul-92	27-Jul-92
Bromodichloromethane	µg/L	EPA 601	<0.7	<0.7
Bromoform	µg/L	EPA 601	<0.7	<0.7
Carbon tetrachloride	µg/L	EPA 601	<0.6	<0.6
Chlorobenzene	µg/L	EPA 601	<0.7	<0.7
Chloroethane	µg/L	EPA 601	<0.5	<0.5
Chloroform	µg/L	EPA 601	<0.5	<0.5
Chloromethane	µg/L	EPA 601	<0.6	<0.6
Chlorodibromomethane	µg/L	EPA 601	<0.6	<0.6
1,2-Dichlorobenzene	µg/L	EPA 601	<4	<4
1,3-Dichlorobenzene	µg/L	EPA 601	<2	<2
1,4-Dichlorobenzene	µg/L	EPA 601	<4	<4
Dichlorodifluoromethane	µg/L	EPA 601	<1	<1
1,1-Dichloroethane	µg/L	EPA 601	<0.4	<0.4
1,2-Dichloroethane	µg/L	EPA 601	<0.3	<0.3
1,1-Dichloroethene	µg/L	EPA 601	<0.2	<0.2
trans-1,2-Dichloroethene	µg/L	EPA 601	<0.4	<0.4
1,2-Dichloropropane	µg/L	EPA 601	<0.5	<0.5
cis-1,3-Dichloropropene	µg/L	EPA 601	<0.5	<0.5
trans-1,3-Dichloropropene	µg/L	EPA 601	<0.6	<0.6
Methylene chloride	µg/L	EPA 601	<2	<2
1,1,2,2-Tetrachloroethane	µg/L	EPA 601	<0.5	<0.5
Tetrachloroethylene	µg/L	EPA 601	<0.5	<0.5
1,1,1-Trichloroethane	µg/L	EPA 601	<0.5	<0.5
1,1,2-Trichloroethane	µg/L	EPA 601	<0.6	<0.6
Trichloroethylene	µg/L	EPA 601	<0.3	<0.3
Trichlorofluoromethane	µg/L	EPA 601	<0.4	<0.4
Vinyl chloride	µg/L	EPA 601	<0.5	<0.5
Bromomethane	µg/L	EPA 601	<0.7	<0.7
2-Chloroethylvinyl ether	µg/L	EPA 601	<1	<1
cis-1,2-Dichloroethene	µg/L	EPA 601	<0.4	<0.4
Freon 113	µg/L	EPA 601	<0.6	<0.6
1,3-Dichlorobenzene	µg/L	EPA 602	<0.3	<0.3
1,4-Dichlorobenzene	µg/L	EPA 602	<0.5	<0.5
Ethyl benzene	µg/L	EPA 602	<0.3	<0.3
Chlorobenzene	µg/L	EPA 602	<0.3	<0.3
Toluene	µg/L	EPA 602	8.7	8.9
Benzene	µg/L	EPA 602	<0.4	<0.4
1,2-Dichlorobenzene	µg/L	EPA 602	<0.5	<0.5
o-Xylene	µg/L	EPA 602	<0.4	<0.4
m-Xylene	µg/L	EPA 602	<0.4	<0.4
p-Xylene	µg/L	EPA 602	<0.4	<0.4

NOTE: Shaded blocks indicate detectable concentrations of volatile organics.

Appendix D

WasteWatR™ Information

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Instructions for the use of

WasteWatR™ Quality Control Standards

Caution: Read instructions carefully before opening **WasteWatR™** standards.

I. Standard Preparation

A. The MINERALS, HARDNESS and GREASE & OIL Quality Control Standards have been prepared as whole volume samples for use full strength without dilution.

B. DEMAND, NUTRIENTS, CYANIDE & PHENOL, RESIDUAL CHLORINE and TRACE METALS standards are concentrates and must be diluted by the following directions before analysis. Only the diluted concentrates are to be considered as sample, not the concentrates themselves. Approximately 11 ml of each concentrate is supplied so that two dilutions of each standard can be prepared. Approximately 2.5 ml of RESIDUAL CHLORINE concentrate is provided.

1. TRACE METALS concentrate. Volumetrically pipet (with a clean, dry pipet) 5.0 ml of concentrate into a 500 ml volumetric flask; add nitric acid to preserve and dilute to the mark with reagent water. No separate dilution is required for silver.
2. DEMAND, NUTRIENTS and CYANIDE & PHENOL concentrates. Volumetrically pipet (with a clean, dry pipet) 5.0 ml of concentrate into a 1 liter volumetric flask; dilute to the mark with reagent water. Prepare and analyze each concentrate independently of the others. If you desire other concentrations, dilute the concentrates proportionately and multiply the approximate, certified values and advisory range of values by the appropriate factor.
3. RESIDUAL CHLORINE concentrate. Volumetrically pipet 1.0 ml into a 1 liter volumetric flask; dilute to the mark with reagent water that has been verified to be free of organics. Analyze immediately upon dilution.

C. The stability and certified values are unconditionally guaranteed for one year. Due to possible sample contamination the guarantee is void after the samples are opened.

II. Standard Storage

A. MINERALS, HARDNESS and GREASE & OIL standards should be stored at or below 25°C.

B. DEMAND, NUTRIENTS, CYANIDE & PHENOL, RESIDUAL CHLORINE and TRACE METALS standards have been prepared in concentrated form to increase their stability. Concentrates should be stored at or below 25°C in the dark. However, the preservative treatment is rendered ineffective once the concentrates are opened and diluted. Therefore, the **WasteWatR™** standards supplied in concentrate form must be analyzed as soon as possible after the concentrates are opened and diluted.

III. Standard Analysis

Remember... ERA **WasteWatR™** standards are a tool to help you evaluate the accuracy of your wastewater data. Therefore, ERA **WasteWatR™** standards should be analyzed as part of a routine sample load by your regular methods including all preparation or digestion steps. A list of "Approximate Concentrations" for ERA **WasteWatR™** standards is on the reverse side to assist the analyst in choosing an appropriate aliquot for analysis.

A. MINERALS and HARDNESS standards must be well shaken for 5 seconds before removing every aliquot for analysis. Be careful to correct for pH, color and turbidity effects in each analysis. If there are any visible clumps in the samples, homogenize before analysis. The alkalinity is titrated to pH4.5. Alkalinity and pH should be analyzed immediately upon opening the MINERALS standard.

B. Transfer the whole GREASE & OIL standard to a separatory funnel. Carefully rinse the sample bottle with solvent, add the solvent washings to the funnel and extract the sample well. The certified value of GREASE & OIL is given as mg per bottle to avoid confusion due to the sample volume being less than 1 liter. Great care must be taken in the extraction, separation and drying steps to avoid determining results that are too low. Certified values are given for both gravimetric and infrared methods of analysis.

C. DEMAND standard must be seeded with a biologically active seed material when determining BOD. Be sure to determine the BOD of the seed material so that a proper seed correction can be made. See "Standard Methods for the Examination of Water and Wastewater" for complete details. Commonly, a laboratory will determine the correct values for COD and TOC but be low for BOD. If this happens, check the quality of the seed. Note that phosphorus and Kjeldahl nitrogren are analyzed out of the DEMAND standard. Both parameters are present as organic compounds which will test the adequacy of your digestion methods.

D. NUTRIENTS standard contains common interferences which will really test your methods. Be sure to check for pH before sample analysis.

E. CYANIDE & PHENOL standard is prepared using free and complex cyanide. An inadequate sample digestion will cause cyanide results to be significantly low. Check the sample pH before performing the phenol distillation, and acidify only under a fume hood.

F. TRACE METALS standard is prepared so that the analyses can be completed by ICP or atomic absorption. If low recoveries are obtained when using GFAA, ERA recommends the use of standard additions.

G. RESIDUAL CHLORINE standard must be prepared in organic-free water. If you use a "kit" for analysis, typically your results will be too low. Check your reagents or change methods.

IV. Certified Results

The ERA certified and advisory range of values are included. The advisory range is the range of values that an experienced laboratory can expect to attain using the most precise methods and equipment. In determining its advisory ranges, ERA considers both the parameter and the most commonly used method of analysis for the parameter. Whenever available the advisory range is based on EPA data collected during method or performance evaluation studies. **ERA stresses that it is the responsibility of the individual laboratory to determine acceptable levels of performance for a particular analytical result depending on the intended use of the data.**

V. Safety

ERA products may be hazardous and are intended for use by professional laboratory personnel trained in the competent handling of such materials. Responsibility for the safe use of these products rests entirely with the buyer and/or user. If you need a Material Safety Data Sheet for any ERA product, please call toll-free at 1-800-ERA-0122.

Approximate Concentrations of

WasteWatR™ Quality Control Standards

These concentration ranges are given to assist the analyst in choosing the appropriate sample aliquot size for analysis.

Parameter	Approximate Concentration mg/l
MINERALS	
total solids at 105°C	500-2000
dissolved solids at 180°C	500-2000
conductivity	500-2500 micromhos
alkalinity as $CaCO_3$	100-300
chloride	50-400
fluoride	1-20
sulfate	50-400
potassium	50-300
sodium	50-300
pH	6-10 units
HARDNESS	
suspended solids at 105°C	10-120
calcium	50-150
magnesium	5-50
hardness as $CaCO_3$	50-500
GREASE & OIL[1]	10-100 mg/bottle
DEMAND	
BOD	20-300
COD	40-400
TOC	10-100
total phosphorus as P	1-10
Kjeldahl nitrogen as N	1-20
NUTRIENTS	
ammonia as N	1-20
nitrate plus nitrite as N	1-20
phosphate as P	1-10
CYANIDE	0.025-0.5
& PHENOL	0.025-0.5
TRACE METALS	
antimony, arsenic, beryllium, cadmium, selenium, silver, & thallium	0.01-0.25
mercury	0.001-0.02
aluminum, barium, boron, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, strontium, vanadium & zinc	0.05-1.0
RESIDUAL CHLORINE	0.5-3.0

[1]Method References:

a. Gravimetric: 413.1, Separatory Funnel Extraction (EPA 600/4-79-020)

b. Infrared: 413.2 (EPA 600/4-79-020)

c. The oil used in ERA Grease & Oil standards absorbs infrared light more intensely than the reference oil used in 413.2; therefore, the infrared certified values will be approximately 35% higher than those for the gravimetric method.

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Cyanide and Phenol LOT NO. 9939

Certification WasteWatR™ Quality Control Standards

Parameter	LOT NO. 9939 Certified Value[1]		Advisory Range[2]	
MINERALS WasteWatR™	mg/l		mg/l	
total solids at 105°C	1360		1180-1540	
dissolved solids at 180°C	1360		1180-1540	
conductivity at 25°C	1740	micromhos	1450-2010	micromhos
alkalinity	223		198-248	
chloride	265		246-284	
fluoride	7.52		6.3-8.7	
sulfate	202		173-230	
potassium	180		153-207	
sodium	275		233-316	
pH	9.1	S.U.	8.9-9.3	S.U.
HARDNESS WasteWatR™	mg/l		mg/l	
suspended solids at 105°C	61.0		51-71	
calcium	56.2		48-64	
magnesium	13.8		11-16	
hardness as $CaCO_3$	197		169-225	
GREASE & OIL WasteWatR™				
Gravimetric	47.9	mg/bottle	35-60	mg/bottle
Infrared	57.5	mg/bottle	43-72	mg/bottle
DEMAND WasteWatR™	mg/l		mg/l	
BOD	43.7		30-53	
COD	72.8		61-84	
TOC	28.2		24-33	
total phosphorus as P	5.47		4.7-6.3	
Kjeldahl nitrogen as N	3.03		2.4-3.6	
NUTRIENTS WasteWatR™	mg/l		mg/l	
ammonia as N	9.36		7.8-11	
nitrate plus nitrite as N	8.80		7.8-9.7	
phosphate as P	5.79		4.9-6.7	
✔ **CYANIDE WasteWatR™**	mg/l		mg/l	
& PHENOL	0.295		0.21-0.37	
	0.355		0.26-0.44	
RESIDUAL CHLORINE WasteWatR™	mg/l		mg/l	
	2.66		2.0-3.1	
TRACE METALS WasteWatR™	µg/l		µg/l	
aluminum	331		271-390	
antimony	112		84-132	
arsenic	132		99-156	
barium	290		238-342	
beryllium	130		107-153	
boron	223		182-263	
cadmium	148		121-175	
chromium	156		127-184	
cobalt	134		110-158	
copper	205		168-242	
iron	337		276-398	
lead	232		190-274	
manganese	171		140-202	
mercury	3.62		2.7-4.5	
molybdenum	244		200-288	
nickel	268		219-316	
selenium	118		88-139	
silver	112		91-132	
strontium	131		107-154	
thallium	78.7		59-93	
vanadium	86.7		71-102	
zinc	93.0		76-110	

[1]Certified values are equal to 100% of each parameter in the indicated standard.

[2]Advisory ranges are listed as guidelines for acceptable recoveries given the limitations of the EPA methodologies commonly used to determine these parameters. The range closely approximates the 95% confidence interval for these parameters based upon the experimental data generated by ERA and data from the USEPA WP, WS and CLP interlaboratory performance evaluation programs.

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Certification WasteWatR™ Quality Control Standards

Chemical Oxygen Demand LOT NO. 9933

Parameter	LOT NO. 9933 Certified Value mg/l		Advisory Range mg/l	
MINERALS WasteWatR™				
total solids at 105°C	834		725-942	
dissolved solids at 180°C	834		725-942	
conductivity at 25°C	1070	micromhos	963-1180	micromhos
alkalinity	148		136-160	
chloride	143		133-153	
fluoride	4.1		3.7-4.5	
sulfate	124		107-141	
potassium	110		94-126	
sodium	162		138-186	
pH	9.1	units	8.9-9.3	units
HARDNESS WasteWatR™				
suspended solids at 105°C	26		22-30	
calcium	64		55-73	
magnesium	46		40-52	
hardness as $CaCO_3$	350		301-406	
GREASE & OIL WasteWatR™				
Gravimetric	37	mg/bottle	28-46	mg/bottle
Infrared	49	mg/bottle	37-61	mg/bottle
DEMAND WasteWatR™				
BOD	37		27-47	
COD	62		53-71	
TOC	24		20-28	
total phosphorus as P	4.9		4.2-5.6	
Kjeldahl nitrogen as N	2.8		2.2-3.3	
NUTRIENTS WasteWatR™				
ammonia as N	2.6		2.2-3.0	
nitrate plus nitrite as N	7.1		6.3-7.9	
phosphate as P	1.7		1.4-2.0	
CYANIDE WasteWatR™ & PHENOL	0.355 0.134		0.26-0.45 0.10-0.17	
RESIDUAL CHLORINE WasteWatR™	1.65		1.45-1.85	
TRACE METALS WasteWatR™ [1]	µg/l		µg/l	
aluminum	362		297-427	
antimony	103		79-124	
arsenic	111		81-131	
barium	204		167-241	
beryllium	62		51-73	
boron	199		163-235	
cadmium	173		142-204	
chromium	264		216-312	
cobalt	172		141-203	
copper	295		242-348	
iron	444		364-524	
lead	81		66-96	
manganese	150		123-177	
mercury	9.5		7.5-12	
molybdenum	156		128-184	
nickel	127		104-150	
selenium	74		55-87	
silver	70		52-83	
strontium	185		152-218	
thallium	111		83-131	
vanadium	215		176-254	
zinc	548		449-647	

[1] Beginning with Lot #9933, the Trace Metals WasteWatR™ standard contains strontium and no longer contains titanium. If this modification creates a problem, please contact ERA at 1-800-ERA-0122.

ENVIRONMENTAL
RESOURCE ASSOCIATES
Arvada, Colorado 80002 1-800-ERA-0122

Certification WasteWatR™ Quality Control Standards

Parameter	LOT NO. 01032 Certified Value[1]	Advisory Range[2]
TRACE METALS WasteWatR™	µg/l	µg/l
aluminum	274	220-323
antimony	134	100-158
arsenic	106	80-125
barium	469	384-553
beryllium	81.3	67-96
boron	102	83-120
cadmium	148	121-174
chromium	831	681-980
cobalt	200	164-236
copper	221	181-261
iron	168	125-198
lead	76.7	63-90
manganese	188	154-222
mercury	8.12	6.1-10
molybdenum	101	83-119
nickel	346	284-409
selenium	81.2	61-96
silver	89.5	73-106
strontium	468	384-552
thallium	46.3	35-55
vanadium	260	213-307
zinc	99.5	82-117

Trace Metals LOT NO. 01032

[1]Certified values are equal to 100% of each parameter in the indicated standard.

[2]Advisory ranges are listed as guidelines for acceptable recoveries given the limitations of the EPA methodologies commonly used to determine these parameters. The range closely approximates the 95% confidence interval for these parameters based upon the experimental data generated by ERA and data from the USEPA WP, WS and CLP interlaboratory performance evaluation programs.

Appendix E

Maps

Table E-1. Locations of Sampling Sites

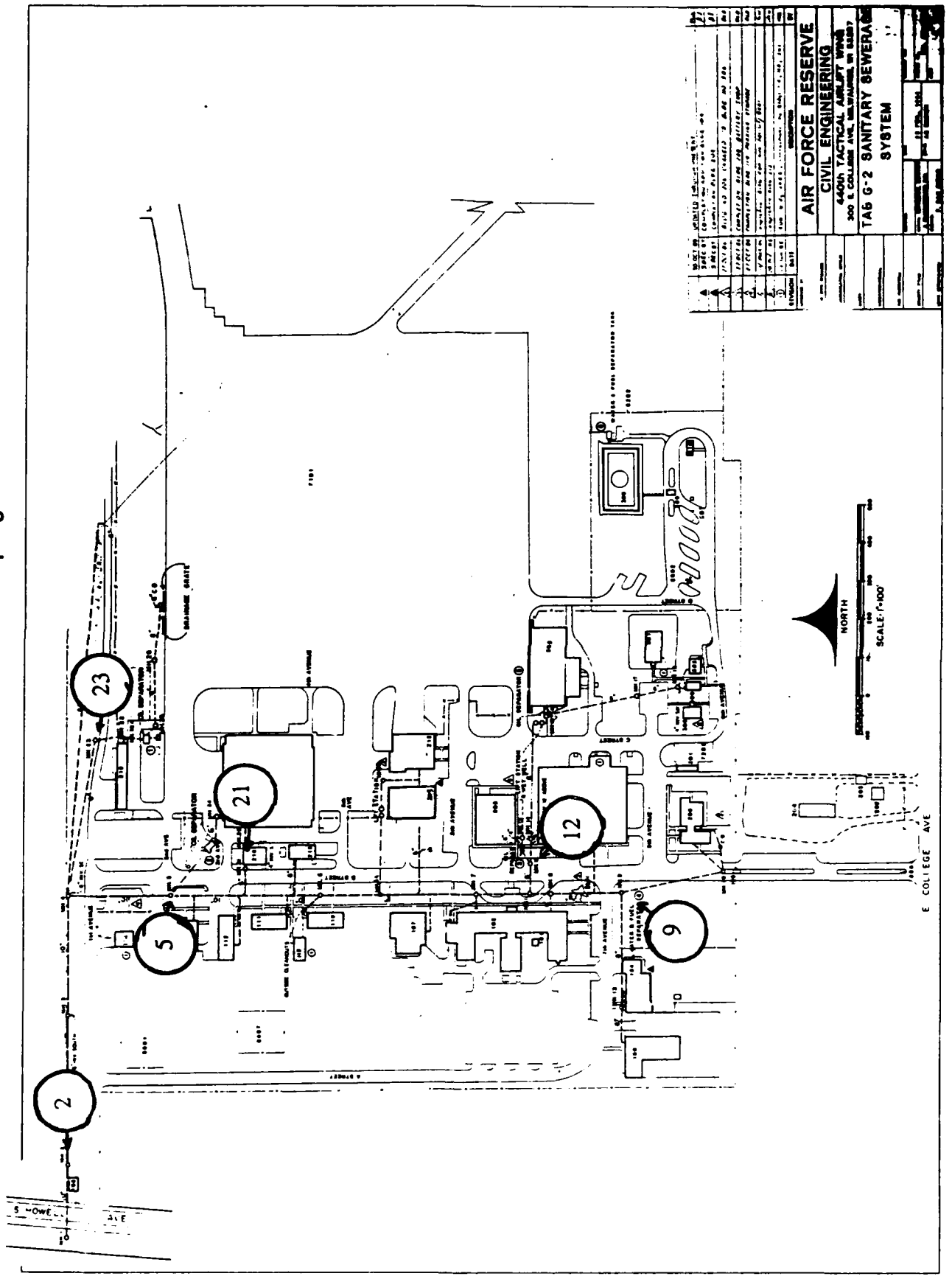
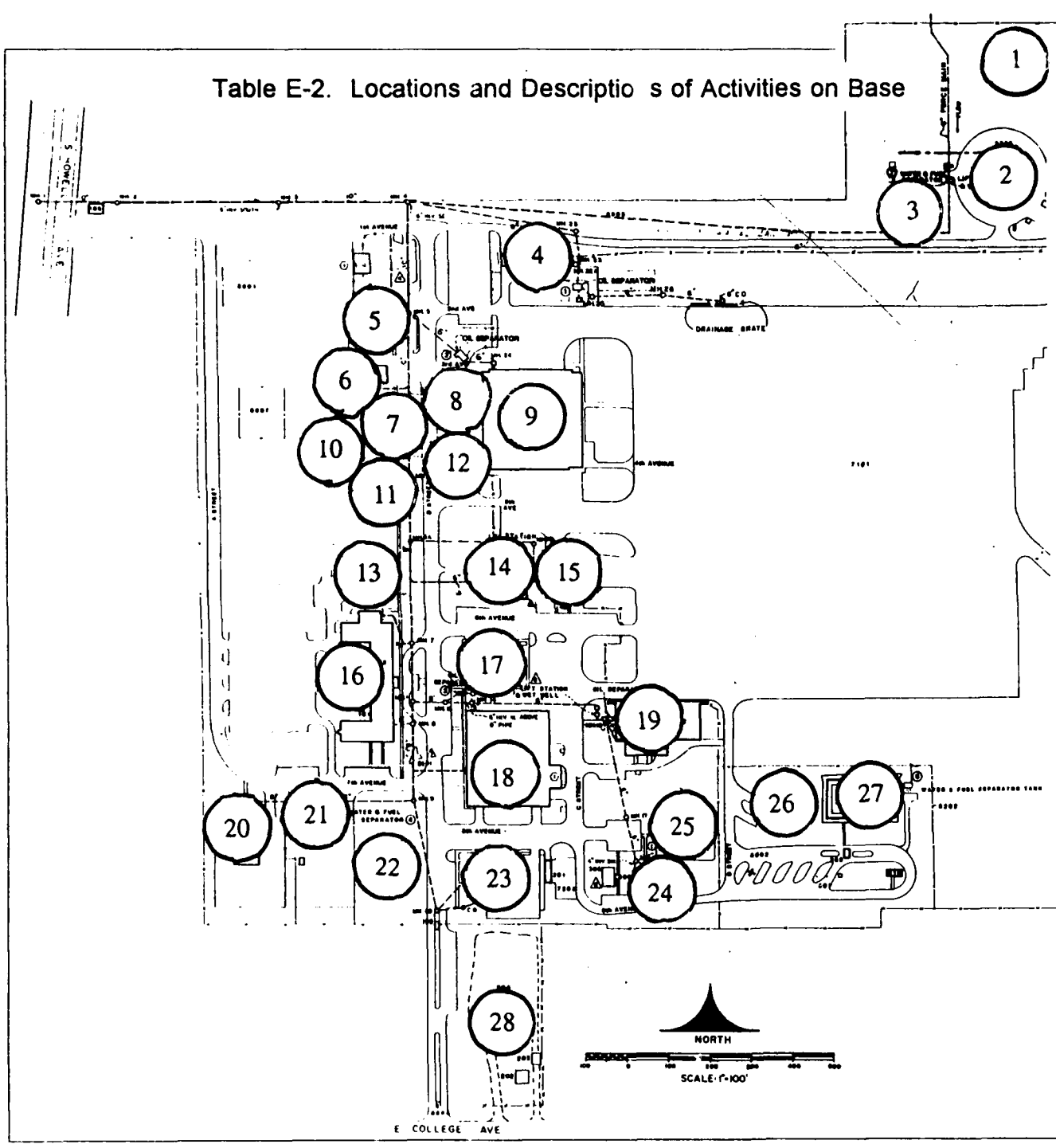


Table E-2. Locations and Descriptio s of Activities on Base



1 To US Army Reserve Center
2 Fire Training
3 Hazardous Waste Storage
4 Air Ground Equipment (AGE) (Bldg 219)
5 Mobil Aerial Port (Bldg 113)
6 Chute Shop (Bldg 112)
7 Club (Bldg 111)
8 Nondestructive Inspection (Bldg 218)
9 Aircraft Maintenance (Bldg 217)
10 Racquetball court (Bldg 115)
11 Weight Room (Bldg 110)
12 Boiler Plant (Bldg 215)
13 Dining Hall (Bldg 107)
14 Flight Squadron (Bldg 209)
15 Fire Department (Bldg 212)
16 Headquarters/Clinic (Bldg 102)
17 Aircraft Maintenance (Bldg 208)
18 Supply Warehouse (Bldg 205)
19 Fuel Cell (Bldg 302)
20 Civil Engineering (Bldg 106)
21 Vehicle Maintenance (Bldg 104)
22 CBPO (Bldg 103)
23 Security Police (Bldg 200)
24 Fuel Shop (Bldg 303)
25 Indoor Small Arms Range (Bldg 301)
26 Fuel Tanks
27 Fuel Tank (Bldg 308)
28 ALCF (Bldg 204)

AIR FORCE RESERVE
CIVIL ENGINEERING
440th TACTICAL AIRLIFT WING
TAB G-2 SANITARY SEWERAGE SYSTEM